Diamond Growth on an Array of Seeds: The Revolution of Diamond Production

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Abstract

Industrial diamond production was pioneered by General Electric Company of U. S. in 1957 and followed by De Beers of S. Africa in 1961. The two companies optimized the production of diamond grits by heating alternative layers of graphite disks and metal catalyst (Fe, Ni, Co) under high pressure. Although there have been 20 countries attempting to duplicate the success of GE and DB, only Iljin Diamond of S. Korea is able to join the lucrative business starting with a technology provided by the author in 1989. In 1970s Winter of Germany developed a powdered mixture of graphite and metal and demonstrated that this assembly can greatly improve the diamond yield and quality. This technology has since been applied to make high grade saw diamond by the above "big three."

China start commercial production of diamond grits in 1966, since then, their diamond output has been growing at a much faster pace than that of the "big three." Today, Chinese makes 2/3 of diamond grits of the world consumption of about 600 tons. However, Chinese cannot make saw diamond larger than about 45 mesh (0.36 mm). Even so, the "big three" has felt the pressure of "yellow fever." As a consequence, De Beers reorganized their industrial diamond group in 2000 and renamed it Element Six, GE Superabrasives was sold to Little John in 2003, and Iljin Diamond suffered the first loss in 2003.

The world high pressure diamond synthesis is due for another technology advancement, this time, the random nucleation of diamond in the reaction cell is planted with a matrix of diamond seeds that will do away with the erratic growth of diamond. The result would be doubling of the diamond yield and quadrupling of the sales value.